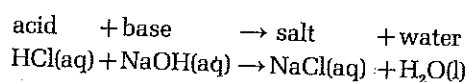


7.7 Preparation of sodium chloride

The reaction of hydrochloric acid and sodium hydroxide to form sodium chloride is an example of the reaction between an acid and base to form a salt.



The exact volume of acid required to neutralize a volume of base can be determined by titration. These volumes of acid and base are then mixed together to give salt and water only.

Aim

To prepare sodium chloride crystals from sodium hydroxide solution and dilute hydrochloric acid.

Apparatus and materials

Measuring cylinder, 25 cm³
Burette, 50 cm³
Stand, boss and clamp
Conical flask, 100 cm³
Tripod and gauze
Bunsen burner and mat
Evaporating basin
Spatula
Microscope
White tile or white paper
Sodium hydroxide solution, 1 mol dm⁻³
Hydrochloric acid solution, 1 mol dm⁻³
Methyl orange indicator solution
Distilled water

Precaution

Sodium hydroxide solution is corrosive and should be washed off the skin immediately if spilt. Eye protection is essential.

Procedure

- 1 Rinse the burette with distilled water and then dilute hydrochloric acid.
- 2 Allow some of the acid solution to drain through the burette so that the part of the burette below the tap is filled. Fill the burette up to the zero mark or any other whole number near to zero. Clamp the burette in a stand.
- 3 Use the measuring cylinder to pour 25 cm³ of the sodium hydroxide solution into a conical flask.

- 4 Add about five drops of methyl orange indicator solution to the alkali.
- 5 Run acid into the conical flask 5 cm³ at a time until 20 cm³ have been added. Swirl the flask after each addition.
- 6 Add the acid, a few drops at a time, until there is a permanent colour change. Record the volume of acid used. Pour away the contents of the conical flask.
- 7 Pour 25 cm³ of sodium hydroxide solution into an evaporating basin. Add the volume of dilute hydrochloric acid needed to neutralize the alkali.
- 8 Place the evaporating basin on a tripod and gauze. Heat it gently until half the volume of liquid remains.
- 9 Remove the evaporating basin from the gauze. Place a piece of paper over the evaporating basin and leave the solution to cool.
- 10 When crystals appear remove some of them with a spatula. Dry the crystals between two sheets of filter paper.
- 11 Examine the crystals under a microscope. Sketch the shape of a well defined crystal.
- 12 Use adhesive tape to stick small samples of sodium chloride into your exercise book.

Results

Burette reading at start of titration cm³.
Burette reading at end of titration cm³.
The end point occurred when cm³ of acid was added.

Questions

- 1 a) What colour is methyl orange in (i) acid and (ii) alkali?
b) Why is sodium oxide not used to make sodium chloride?
c) What would happen if the sodium chloride solution, containing methyl orange, was evaporated to dryness?
d) What is the shape of a sodium chloride crystal?
e) How would the quality of salt crystals be affected if the salt solution were evaporated to dryness?
- 2 Write a full ionic equation for the reaction of sodium hydroxide solution with dilute hydrochloric acid.